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> The function of education is to teach one to think intensively and to think critically Intelligence plus character—that is the goal of true education

CSIR NET - GENERAL APTITUDE

QUANTITATIVE APTITUDE

L-13 | **Work and time**

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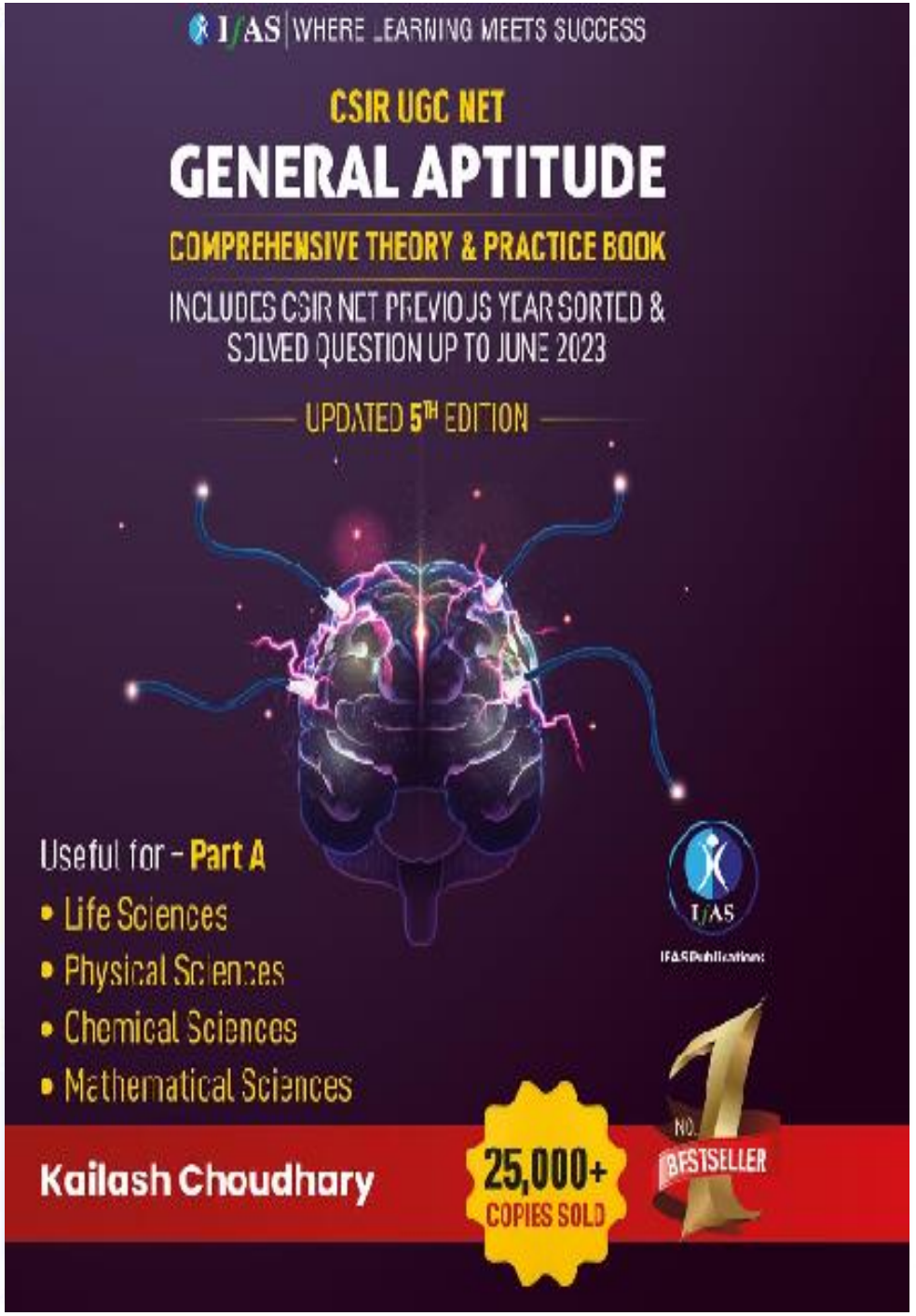
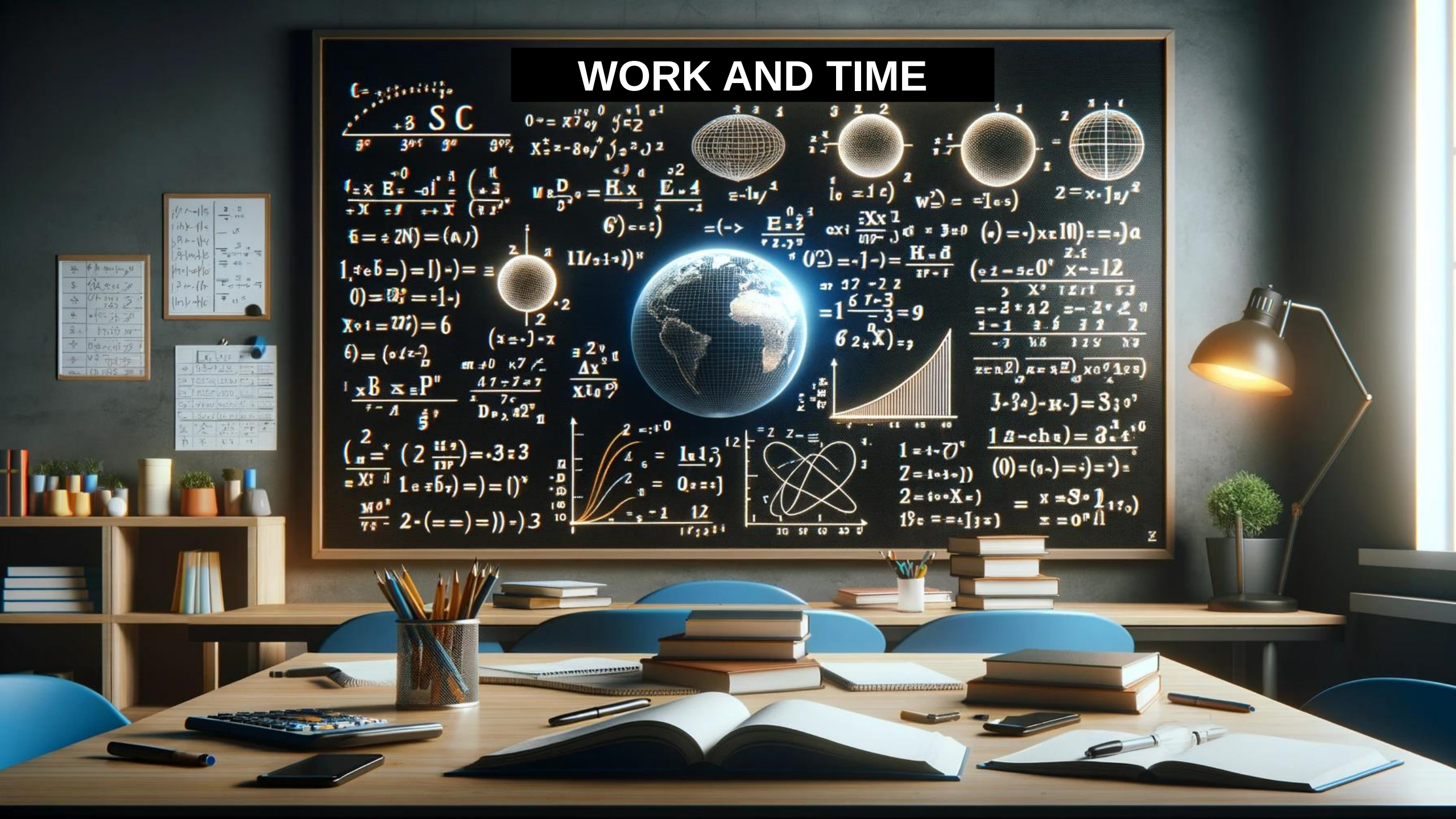


Topic Covered in Today's Session

1. What is work ?
2. LCM method
3. Relation between work time and efficiency ?
4. Practice questions

WORK AND TIME



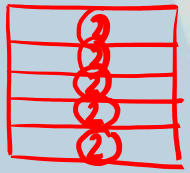
What is work ?

It is the effort applied to accomplish a task.

A = 2 unit/day

B = 5 unit/day

Efficiency



= 10 unit

Time = Work / Efficiency

A = 10/2 = 5 day

B = 10/5 = 2 day

Let Total work be = 1 unit

Work from Days:

If X can do a piece of work in m days, then X's 1 day's work = 1/m of the work

If Y can do a piece of work in n days, then Y's 1 day's work = 1/n of the work

If X and Y work together then their combined work is= $1/m + 1/n$ of the work

A → 10 ✓

B → 15 ✓

(A+B) → x

A's 1 day work = $\frac{1}{10}$

B's 1 day work = $\frac{1}{15}$

(A+B)'s 1 day work = $\frac{1}{x}$

(A+B)'s 1 day work = A's 1 day work + B's 1 day work

$\frac{1}{x} = \frac{1}{10} + \frac{1}{15}$

LCM method

A → 10
B → 15

→ Work / LCM → 30 unit

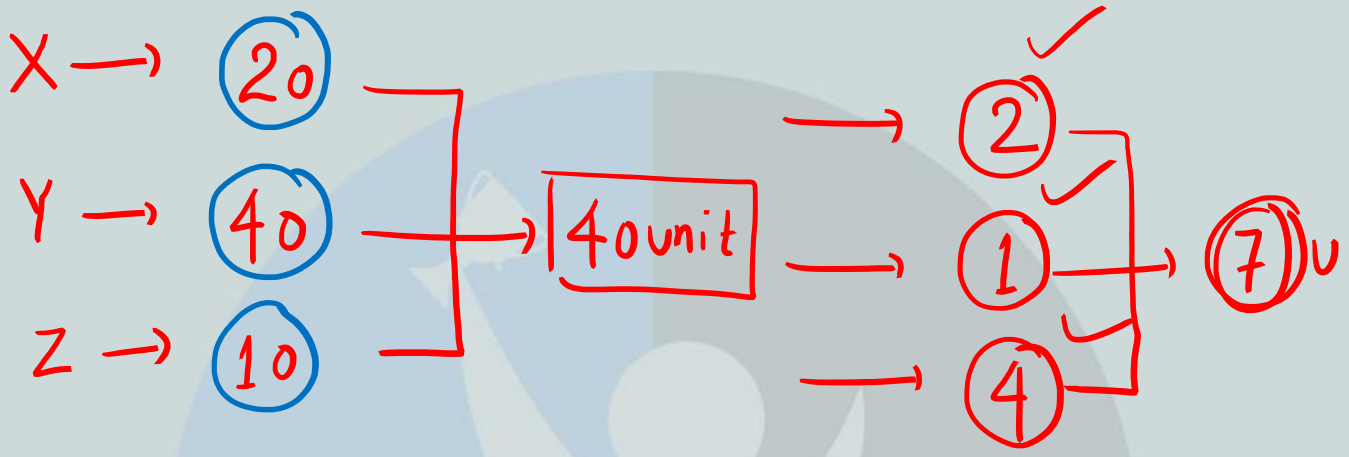
Efficiency

→ $\frac{30}{10} = 3$ u/day

→ $\frac{30}{15} = 2$ u/day

$$\text{Time} = \frac{\text{Work}}{\text{Efficiency}} = \frac{30}{(3+2)} = \frac{30}{5} = 6 \text{ days}$$

$X+Y+Z = ?$



$$\text{Time} = \frac{40}{7} = 5\frac{5}{7} \text{ day}$$

5	10, 15
	2, 3

Relation between work time and efficiency

$$\text{Time} = \frac{\text{Work}}{\text{Eff.}}$$

$$\downarrow \boxed{\text{Time} \propto \frac{1}{\text{Eff.}}} \uparrow$$

T_A	T_B
2	3
E_A	E_B
3	2

Q1. If Varun and Raghav can do a job in 10 days and 15 days independently, how many days would they take to complete the same job working simultaneously?
(1) 6 days (2) 9 days (3) 10 days (4) 12 days

V = 10
R = 15
→ (30) → 3, 2

$$T = \frac{30}{5} = 6 \text{ days}$$

Q2. A and B could do a piece of work in 12 days and 20 days resp. Find the number of days taken by them to complete 2/3rd of the work together. (in days)

(a) 10
(b) 2
(c) 5
(d) 8

A → 12
B → 20
Work → 60 unit
Eff. → 5, 3

$$\text{Time} = \frac{\text{Work}}{\text{Eff.}} = \frac{60 \times \frac{2}{3}}{8} = \frac{40}{8} = 5 \text{ days}$$

4 | 12, 20
3, 5
4 × 3 × 5 = 60

Q3. A work is completed by P and Q together in 30 days. When a third person R joined them, then the work is completed in 18 days. In how many days, the work is completed by R alone? (in days)

(a) 25
(b) 20
(c) 45
(d) 30

$P+Q = 3$

$P+Q+R = 5$

$3+R = 5$

$R = 2$

$(P+Q) \rightarrow 30$

$P+Q+R \rightarrow 18$

1 work → 90 unit

$P+Q = 3$, $P+Q+R = 5$

$3+R = 5$, $R = 2$

$T_R = \frac{\text{work}}{\text{Eff of R}} = \frac{90}{2} = 45$ days

6	30, 18
	5, 3

$6 \times 5 \times 3 = 90$

Q4. A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?

(a) 12days (b) 15days (c)16days (d)18 days

(c)

A → 20
B → 30
C → 60

Work → 60 unit

Eff.
→ 3
→ 2
→ 1

1 2 3 | 4 5 6

A A (A+B+C) A A (A+B+C)

3 + 3 + (3+2+1) 3 3 (3+2+1)

12 unit 12 unit

12 u → 3 days

1 u → $\frac{3}{12} \times 60^{5}$ = 15 days

60 u

Q5. A and B can do a piece of work in 15 days. B and C can do the same work in 10 days and A and C can do the same work in 12 days. Time taken by A, B and C together to do the job is?

(a) 4 days (b) 9 days (c) 8 days (d) 5 days

2	15, 10, 12
3	15, 5, 6
5	5, 5, 2
	1 1 2

$2 \times 3 \times 5 \times 2 = 60$

$A+B \rightarrow 15$

$B+C \rightarrow 10$

$A+C \rightarrow 12$

$60 \rightarrow 4, 6, 5$

$A+B+C = ?$

$A+B+B+C+A+C = 4+6+5$

$2A+2B+2C = 15$

$2(A+B+C) = 15$

$(A+B+C) = \frac{15}{2}$

$\text{Time} = \frac{60}{15} \times 2$

$= 8 \text{ days}$

Q6. A can complete a piece of work in 10 days, B in 15 days and C in 20 days. A and C worked together for two days and then A was replaced by B. In how many days, altogether, the work was completed?

(a) 12 days (b) 10 days (c) 6 days (d) 8 days

A → 10
B → 15
C → 20

→ 60 Unit

→ 6
→ 4
→ 3

(A+C) + (B+C) = 60

(6+3) × 2

9 × 2

18 + (4+3)x = 60

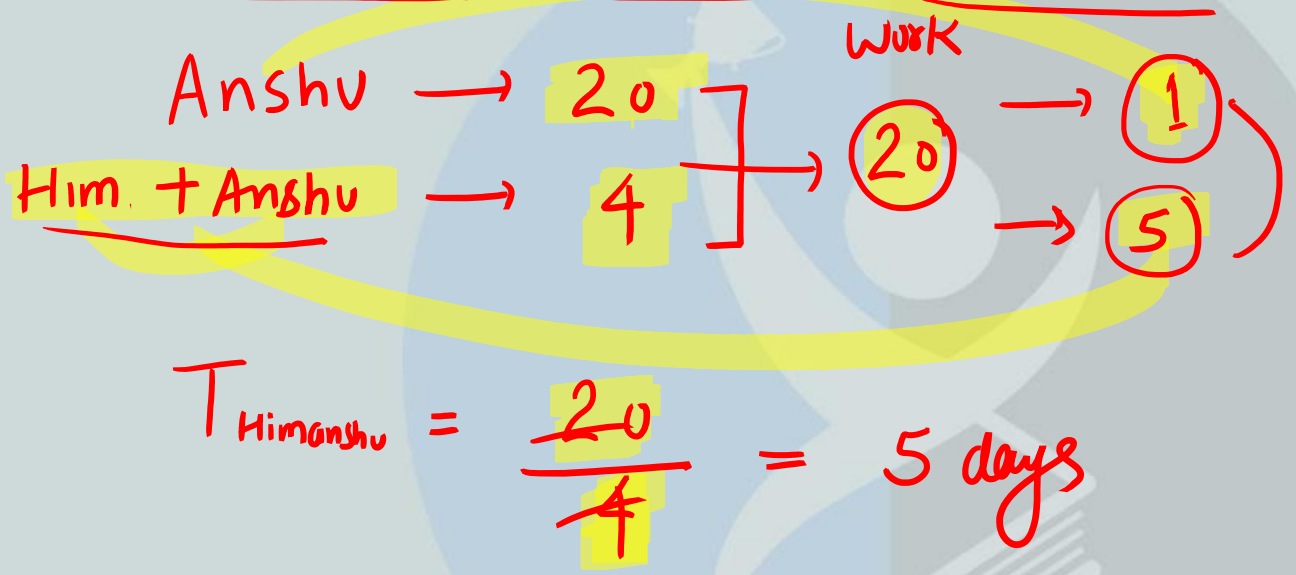
7x = 60 − 18

$x = \frac{42}{7} = 6$ days

Total Time = 2 + 6 = 8 days

Q7. Anshu completes 25% of work in 5 days but due to lack of time, Himanshu joins Anshu and they together complete the remaining work in 3 days. Find the number of days Himanshu would take to complete the same work alone? (in days)

(a)2.5
(b)12
(c)5
(d)8



$$T_{Himanshu} = \frac{20}{4} = 5 \text{ days}$$

75% = 3
1% = 3/75
100% = 3 × 100/75 = 4 days

Q8. It takes 2 hours for Tiwari and Deo to do a job. Tiwari and Hari take 3 hours to do the same job. Deo and Hari take 6 hours to do the same job. Which of the following statements is incorrect?

(1) Tiwari alone can do the job in 3 hours

(2) Deo alone can do the job in 6 hours

(3) Hari does not work at all

(4) Hari is the fastest worker

HW

Q9. A, B and C can complete a work in 10, 12 and 15 days respectively. A left the work 5 days before the work was completed and B left 2 days after A had left. The number of days required to complete the whole work is?

(a) 8⅔ days (b) 6⅔ days (c) 7 days (d) 6 days

HW

1. Number system → Exponential property → 2
2. Speed time distance → 2
3. Percentage → 1 - 2
4. Permutation & Combination → 1
5. Probability → 1
6. Data Int → 1 - 2
7. Mensuration & Geometry → 2 - 3
8. Basic Science → 1

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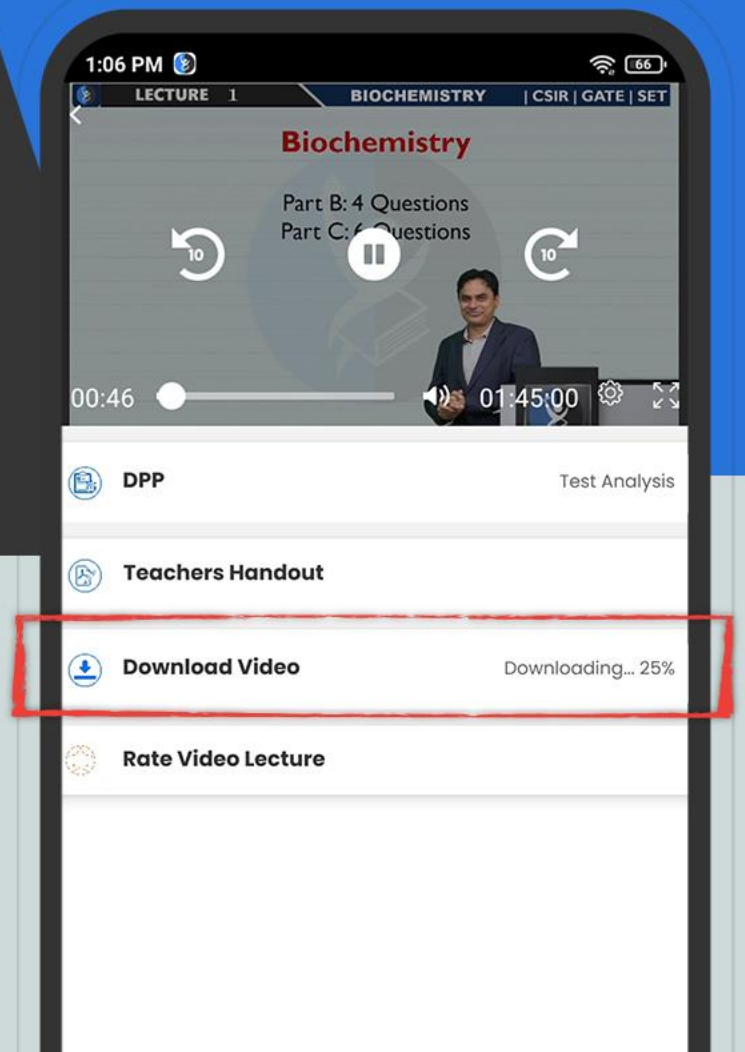

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